

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Currently amended) A system for cooling electronic components, the system
2 comprising:
3 a surface;
4 one or more electronic components coupled to the surface;
5 a blower coupled to the surface, the blower having a first port, a second
6 port, and an impeller which rotates around an axis perpendicular to the surface,
7 the blower oriented such that air flowing ~~across~~ into the first port flows through a
8 channel formed by the blower and the surface, wherein the blower moves air
9 across the one or more electronic components through a channel formed by the
10 blower and the surface and perpendicular to the axis of impeller rotation ; and
11 a shroud defining an interior cavity and attachable to the surface so as to
12 form an airflow path between the shroud and the surface when attached, the
13 interior cavity having a first end sized to receive a heat sink therein and a second
14 end sized substantially the same as one of the first port and second port.
- 1 2. (Original) The system according to claim 1, wherein the surface is a circuit
2 board.
- 1 3. (Original) The system according to claim 1, wherein air flows into the first port
2 and exits the second port.
- 1 4. (Original) The system according to claim 1, wherein air flows into the second
2 port and exits the first port.

1 5. (Original) The system according to claim 1, wherein the system has a height of
2 less than 1.75".

1 6. (Currently amended) A system for cooling electronic components, the system
2 comprising:

3 a surface;

4 one or more electronic components coupled to the surface; and

5 a blower coupled to the surface, the blower having a first port, a second
6 port, and an impeller which rotates around an axis perpendicular to the surface,
7 the blower oriented such that the first port is located above at least one of the
8 one or more electronic components, wherein air flowing through the first port
9 flows across the at least one of the one or more electronic components and
10 perpendicular to the axis of impeller rotation; and

11 ~~a shroud defining an interior cavity and attachable to the surface so as to~~
12 ~~form an airflow path between the shroud and the surface when attached, the~~
13 ~~interior cavity having a first end sized to receive a heat sink therein and a second~~
14 ~~end sized substantially the same as one of the first port and second port.~~

1 7. (Original) The system according to claim 6, wherein the surface is a circuit
2 board.

1 8. (Original) The system according to claim 6, wherein air flows into the first port
2 and exits the second port.

1 9. (Original) The system according to claim 6, wherein air flows into the second
2 port and exits the first port.

1 10. (Previously Presented) The system according to claim 6, wherein the one or
2 more electronic components includes: an integrated circuit coupled to a heat
3 sink, wherein the blower is arranged proximate the heat sink to provide at least
4 one airflow path between the second port of the blower and the heat sink.

1 11. (Original) The system according to claim 10, wherein air flowing across the heat
2 sink also flows across at least one of the one or more electronic components
3 coupled to the surface.

1 12. (Previously Presented) The system according to claim 10, wherein the shroud is
2 positioned such that air flowing through the second port is substantially directed
3 across the heat sink.

1 13. (Original) The system according to claim 6, wherein the system has a height of
2 less than 1.75".

1 14. (Withdrawn) The system according to claim 6, further comprising a 1U
2 enclosure, the system enclosed within the 1U enclosure.

1 15. (Withdrawn) A rack comprising:
2 a mounting fixture; and
3 a plurality of the systems of claim 6 mounted in parallel.

1 16. (Currently amended) A system for cooling electronic components, the system
2 comprising:
3 a surface;
4 one or more electronic components coupled to the surface, the one or
5 more electronic components including an integrated circuit in contact with a heat
6 sink;
7 a blower directly mounted to the surface, the blower having a first port, a
8 second port, and an impeller which rotates around an axis perpendicular to the
9 surface, wherein the blower is arranged proximate the heat sink wherein air
10 flowing through the first port flows across the at least one of the one or more
11 electronic components and perpendicular to the axis of impeller rotation; and

~~a shroud having an interior cavity and attached to the surface so as to define an airflow path there between, the interior cavity having a first end sized to receive the heat sink therein and a second end sized substantially the same as and adjacent the second port.~~

17. (Original) The system according to claim 16, wherein the surface is a circuit board.

18. (Original) The system according to claim 16, wherein air flows into the first port and exits the second port.

19. (Original) The system according to claim 16, wherein air flows into the second port and exits the first port.

20. (Original) The system according to claim 16, wherein the blower is oriented such that the first port faces the surface so that air flowing across the first port flows between the blower and the surface.

21. (Original) The system according to claim 20, wherein the first port is located above at least one of the one or more electronic components coupled to the surface, such that air flowing through the first port flows across the at least one of the one or more electronic components.

22. (Original) The system according to claim 16, wherein air flowing across the heat sink also flows across at least one of the one or more electronic components coupled to the surface.

23. (Previously Presented) The system according to claim 16, wherein the shroud is positioned such that air flowing through the second port is substantially directed across the heat sink.

1 24. (Original) The system according to claim 16, wherein the system has a height of
2 less than 1.75".

1 25. (Withdrawn) The system according to claim 16, further comprising a 1U
2 enclosure, the system enclosed within the 1U enclosure.

1 26. (Withdrawn) A rack comprising:
2 a mounting fixture; and
3 a plurality of the systems of claim 16 mounted in parallel.

1 27. (Currently amended) A system for cooling electronic components, the system
2 comprising:
3 a surface;
4 one or more electronic components coupled to the surface, the one or
5 more electronic components including an integrated circuit in contact with a heat
6 sink;
7 a blower directly mounted to the surface, the blower having a first port, a
8 second port, and an impeller which rotates around an axis, the blower oriented
9 such that the axis is perpendicular to the surface and non-intersecting with the
10 heat sink, wherein the blower is wherein the blower moves air across the heat
11 sink and perpendicular to the axis of impeller rotation; and
12 ~~a shroud defining an interior cavity and attachable to the surface so as to~~
13 ~~form an airflow path between the shroud and the surface when attached, the~~
14 ~~interior cavity having a first end sized to receive a heat sink therein and a second~~
15 ~~end sized substantially the same as one of the first port and second port.~~

1 28. (Original) The system according to claim 27, wherein the surface is a circuit
2 board.

1 29. (Original) The system according to claim 27, wherein air flows into the first port
2 and exits the second port.

- 1 30. (Original) The system according to claim 27, wherein air flows into the second
2 port and exits the first port.
- 1 31. (Original) The system according to claim 27, wherein the blower is oriented such
2 that the first port faces the surface so that air flowing across the first port flows
3 between the blower and the surface.
- 1 32. (Original) The system according to claim 31, wherein the first port is located
2 above at least one of the one or more electronic components coupled to the
3 surface, such that air flowing through the first port flows across the at least one of
4 the one or more electronic components.
- 1 33. (Original) The system according to claim 27, wherein air flowing across the heat
2 sink also flows across at least one of the one or more electronic components
3 coupled to the surface.
- 1 34. (Original) The system according to claim 27, further comprising a shroud
2 positioned such that air flowing through one of the first port and the second port
3 is substantially directed across the heat sink.
- 1 35. (Previously Presented) The system according to claim 27, wherein the system
2 has a height of less than 1.75".
- 1 36. (Withdrawn) The system according to claim 27, further comprising a 1U
2 enclosure, the system enclosed within the 1U enclosure.
- 1 37. (Withdrawn) A rack comprising:
2 a mounting fixture; and
3 a plurality of the systems of claim 27 mounted in parallel.

- 1 38. (Withdrawn) A cooling cartridge for attaching to a surface, the cartridge
2 comprising: a shroud; a heat sink coupled to the shroud; a blower coupled to the
3 shroud, the blower having an impeller axis non-intersecting with the heat sink.
- 1 39. (Withdrawn) The cartridge according to claim 38, wherein the heat sink is
2 coupled to a heat conductor, the heat conductor further coupled to a mounting
3 plate.
- 1 40. (Withdrawn) The cartridge according to claim 39, wherein the heat conductor is
2 flexible.
- 1 41. (Withdrawn) The cartridge according to claim 39, wherein the heat conductor is
2 removably coupled to the heat sink.
- 1 42. (Currently amended) A method for cooling one or more electronic components
2 attached to a surface, the method comprising:
3 generating airflow across a heat sink using a blower ~~and a shroud~~, the
4 heat sink coupled to an integrated circuit coupled to the surface, the blower
5 having a first port, a second port, and an impeller which rotates around an axis,
6 the blower coupled to the surface such that the axis is perpendicular to the
7 surface and non-intersecting with the heat sink, ~~the shroud having an interior~~
8 ~~cavity and attached to the surface so as to define an airflow path there between,~~
9 ~~the interior cavity having a first end sized to receive the heat sink therein and a~~
10 ~~second end sized substantially the same as and adjacent to one of the first port~~
11 ~~and second port wherein air flowing through the first port flows across the heat~~
12 ~~sink and perpendicular to the axis of impeller rotation.~~
- 1 43. (Original) The method according to claim 42, wherein directing airflow to the
2 heat sink, air moving across the heat sink also flows across one or more
3 electronic components coupled to the surface.

1 44. (Original) The method according to claim 42, wherein generating airflow includes
2 moving air past at least one electronic component attached to the surface
3 beneath the first port of the blower, the first port of the blower facing the surface
4 so that air flowing across the first port flows between the blower and the surface.

1 45. (Withdrawn) A system for cooling electronic components, the system
2 comprising: a first surface; one or more electronic components coupled to the
3 first surface, the one or more electronic components including an integrated
4 circuit; and a module attached to a second surface, the module including: a heat
5 sink for removing heat from the integrated circuit; a blower for moving air across
6 the heat sink and also across at least one of the one or more electronic
7 components.

1 46. (Withdrawn) The system according to claim 45, wherein the first surface and the
2 second surface are non-overlapping.

1 47. (Withdrawn) The system according to claim 45, wherein the second surface is
2 located above the first surface.

1 48. (Original) The system according to claim 45, wherein the heat sink is coupled to
2 a heat conductor, the heat conductor further coupled to a mounting plate, the
3 mounting plate thermally coupled to the integrated circuit.

1 49. (Withdrawn) The system according to claim 45, wherein the blower has an
2 impeller axis that is perpendicular to the plane of the first surface.

1 50. (Withdrawn) The system according to claim 45, wherein the blower provides at
2 least one airflow path between a port of the blower and the one or more
3 electronic components that is parallel to the plane of the first surface.

- 1 51. (Withdrawn) A system for cooling electronic components, the system
2 comprising: a first surface; one or more electronic components coupled to the
3 first surface, the one or more electronic components including an integrated
4 circuit; and a module coupled to and positioned beside the first surface, the
5 module including: a heat sink for removing heat from the integrated circuit; a
6 blower for moving air across the heat sink and also across at least one of the one
7 or more electronic components.
- 1 52. (Withdrawn) The system according to claim 51, wherein the heat sink is coupled
2 to a heat conductor, the heat conductor further coupled to a mounting plate, the
3 mounting plate thermally coupled to the integrated circuit.
- 1 53. (Withdrawn) The system according to claim 51, wherein the blower has an
2 impeller axis that is perpendicular to the plane of the first surface.
- 1 54. (Withdrawn) The system according to claim 51, wherein the blower provides at
2 least one airflow path between a port of the blower and the one or more
3 electronic components that is parallel to the plane of the first surface.